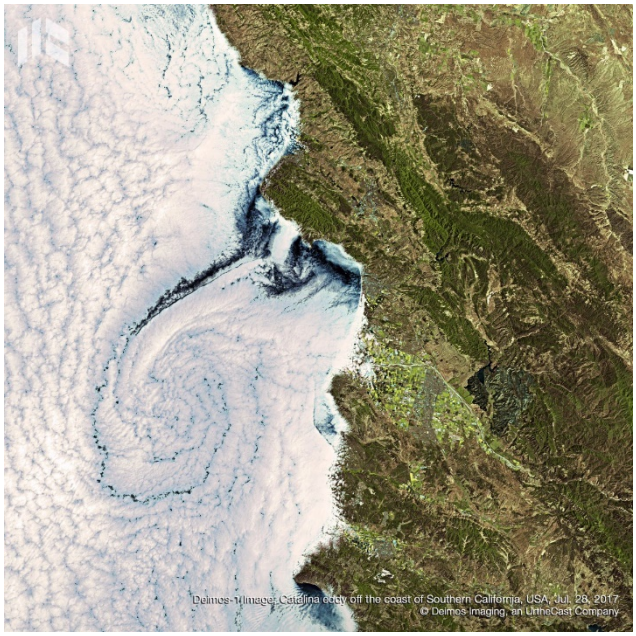
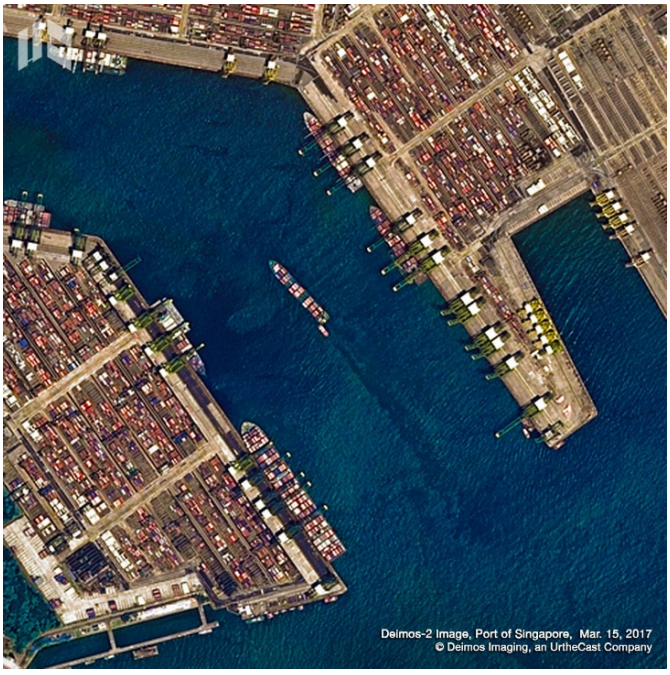
EO-ALERT: Next Generation Satellite Processing Chain for Rapid Civil Alerts

The EO-ALERT project is a European Union research activity, with the aim of achieving very high throughput and very low latency in the delivery of Earth observation images and image products. This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776311. The partners of the project are Deimos Space, DLR, Graz University of Technology, Politecnico di Torino, OHB Italia and Deimos Imaging, an UrtheCast Company, with the participation of the Spanish State Meteorological Agency (AEMET), as a third party. The research project started in January 2018 and will run for three years, nominally finishing in December 2020.



Nowadays, Earth observation (EO) data delivered by remote sensing satellites provides a crucial service to society, with great benefits to the civilian. The data generated by EO satellites is now ubiquitously used throughout society for a range of diverse applications. In Europe, for example, the Copernicus program provides EO data products for many societal needs. EO data provides the basis for governmental monitoring of the Earth's resources to support planning and management, allows for the informed response of authorities in the case of emergencies, and provides the basis for a number of commercial EO products for civil market End Users.

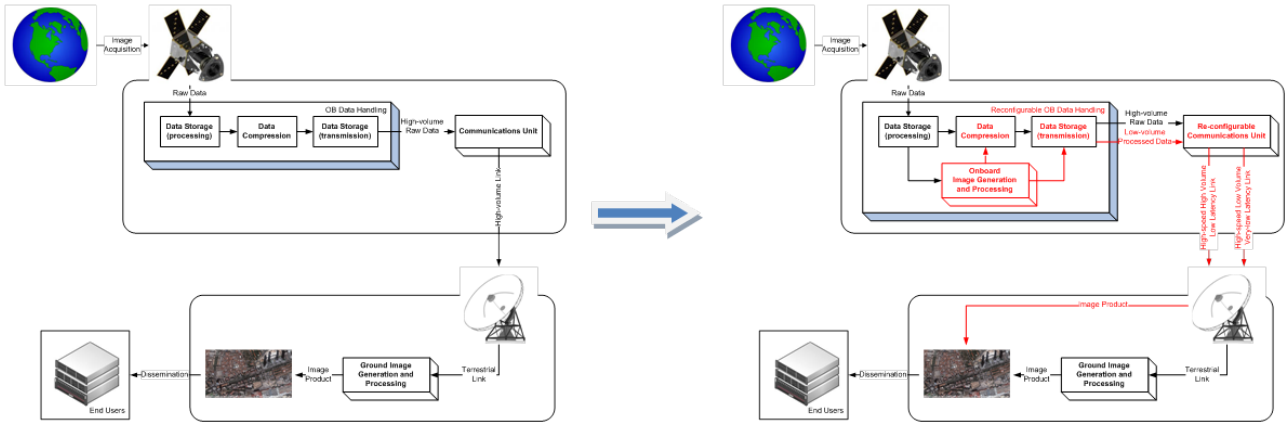
Over the past 50 years, space and satellite industry has mastered the capability to observe the Earth for a diverse range of applications, including environmental and natural resources monitoring, emergency management and civil security. All those applications require a broad spectrum of satellite observation platforms and payloads, typically optical and radar sensors, carefully designed for the observation needs. The EO data chain that has been developed so far, and that is employed in almost all EO satellites, involves the acquisition process of sensor data onboard the satellite (flight segment), its onboard compression and storage, and its transfer to ground (ground segment) by a variety of communication means (microwave and optical), for later processing on ground and the generation of the downstream EO image products. These EO image products represent the real market value of the satellite EO process.



While the market for EO image products is growing, the classical EO data chain generates a severe bottleneck problem, given the very large amount of EO raw data generated on-board the satellite that must be transferred to ground, slowing down the EO product availability, increasing latency, and hampering applications to grow in accordance with the increased user demand for EO products.

The objective of the EO-ALERT project is to move beyond the state of the art, by providing a high-speed data chain, with increased EO data chain throughput, that facilitates the transfer of EO data products with very low latency data to the end user. This will open up EO data to new applications, facilitating their use in everyday life.

EO-ALERT proposes the definition and development of the next-generation EO data and processing chain, based on a novel flight segment architecture that moves optimised key EO data processing elements from the ground segment to the satellite. The key observation of EO-ALERT is that raw sensor data is not the EO product of market value. In commercial applications, the EO raw data is simply an intermediate step towards the generation of EO image products. Hence, if the EO image products can be generated on-board the satellite, given their very low data volume relative to the raw data, they can be delivered to the end user with very low latency, maximizing the utility of EO-based services.



Achieving this goal poses great challenges on the flight system, to be addressed through a combination of innovations in the on-board elements of the data chain and the communications link. As such, this goal necessitates innovation in several critical technological areas; namely on-board reconfigurable data handling, on-board image generation, on-board image processing, high-speed on-board avionics, on-board data compression and reconfigurable high data rate communication links to ground. Such innovations will also provide capabilities for the optimisation of the classical EO data chain towards a data chain with greatly improved data throughput.

Key technological outcomes of the EO-ALERT project will include the on-board image generation and processing algorithms, the development of a flexible and reconfigurable Payload Data Processing Unit for high-speed on-board data processing, and the development of new compression and downlink techniques for high-throughput implementation. The achievement of above outcomes in EO-ALERT will provide Europe with innovative, strategic and market driven next generation EO technologies, ready to be implemented in the European and international EO satellite market.

Starting from June 2018, regular updates on the project achievements will be published on the official project website: www.eo-alert-h2020.eu